

(12) UK Patent Application (19) GB (11) 2 139 796 A

(43) Application published 14 Nov 1984

(21) Application No 8412137

(22) Date of filing 11 May 1984

(30) Priority data

(31) 8313196

(32) 13 May 1983

(33) GB

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(51) INT CL³
G09F 13/18

(52) Domestic classification
G5C EK
B6J 4

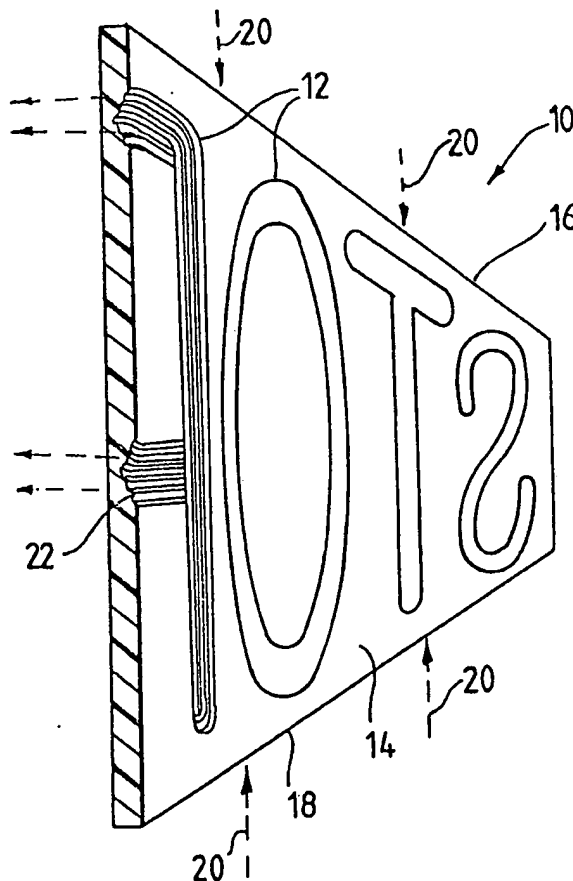
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(58) Field of search
G5C

(54) Edge illuminated signs

(57) An edge illuminated sign has a transparent plate 10 with characters 12 engraved in its rear face 14. Light entering the plate through one or more edges 16, 18 is internally reflected towards and through the front face of the plate so that, from the front, the characters appear illuminated. Distributed illumination across relatively wide character lines is achieved by defining each line as a groove 22 having stepped sides comprising a plurality of inclined reflecting surface portions separated by surface portions parallel to the face of the plate. A rotatable filter (56), Figs. 7 to 9 (not shown) may be employed.

Fig.1.



GB 2 139 796 A



2/5

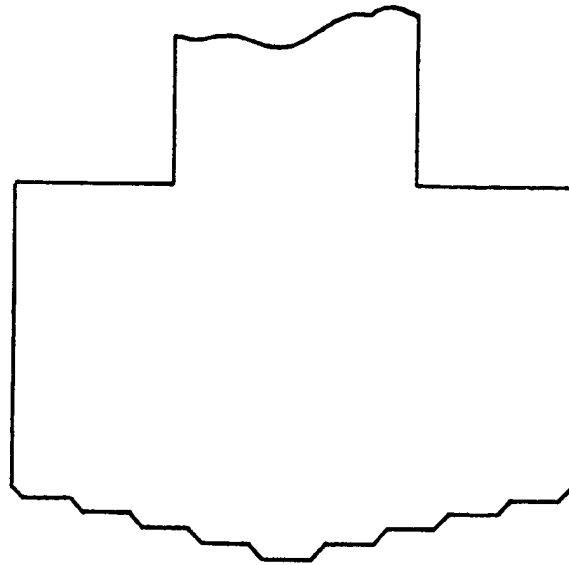


Fig. 3A.

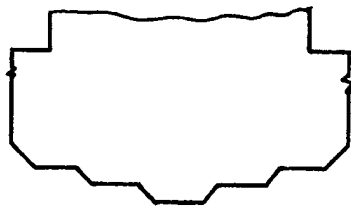


Fig. 3B.

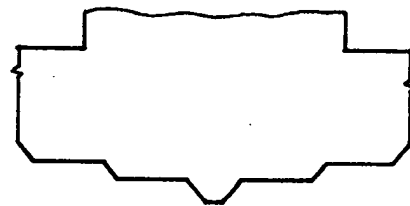


Fig. 3C.

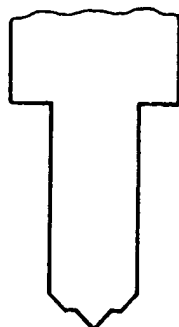


Fig. 3D.

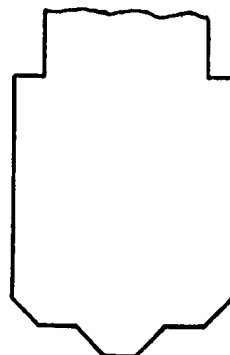


Fig. 3E.

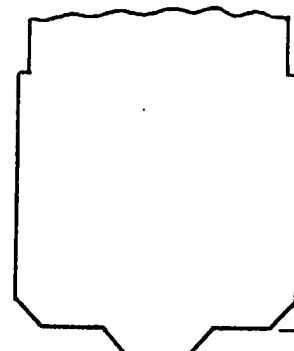
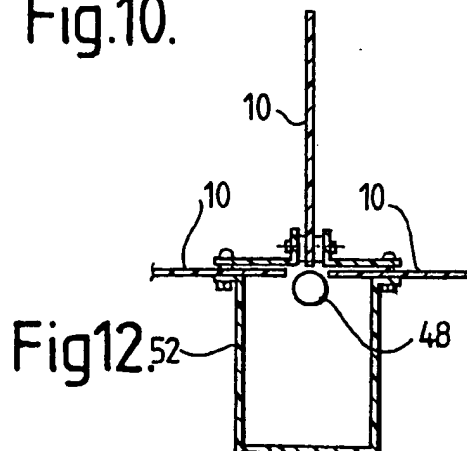
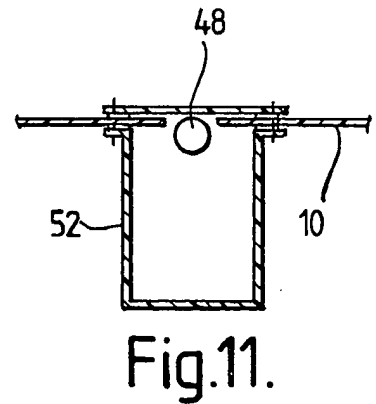
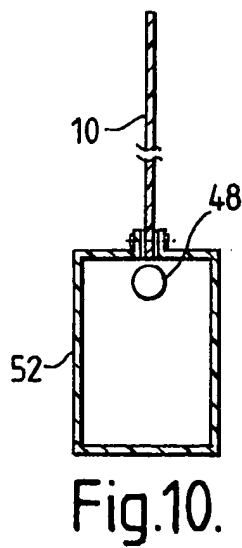
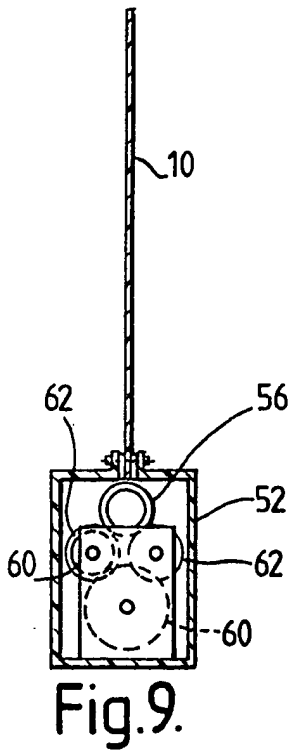
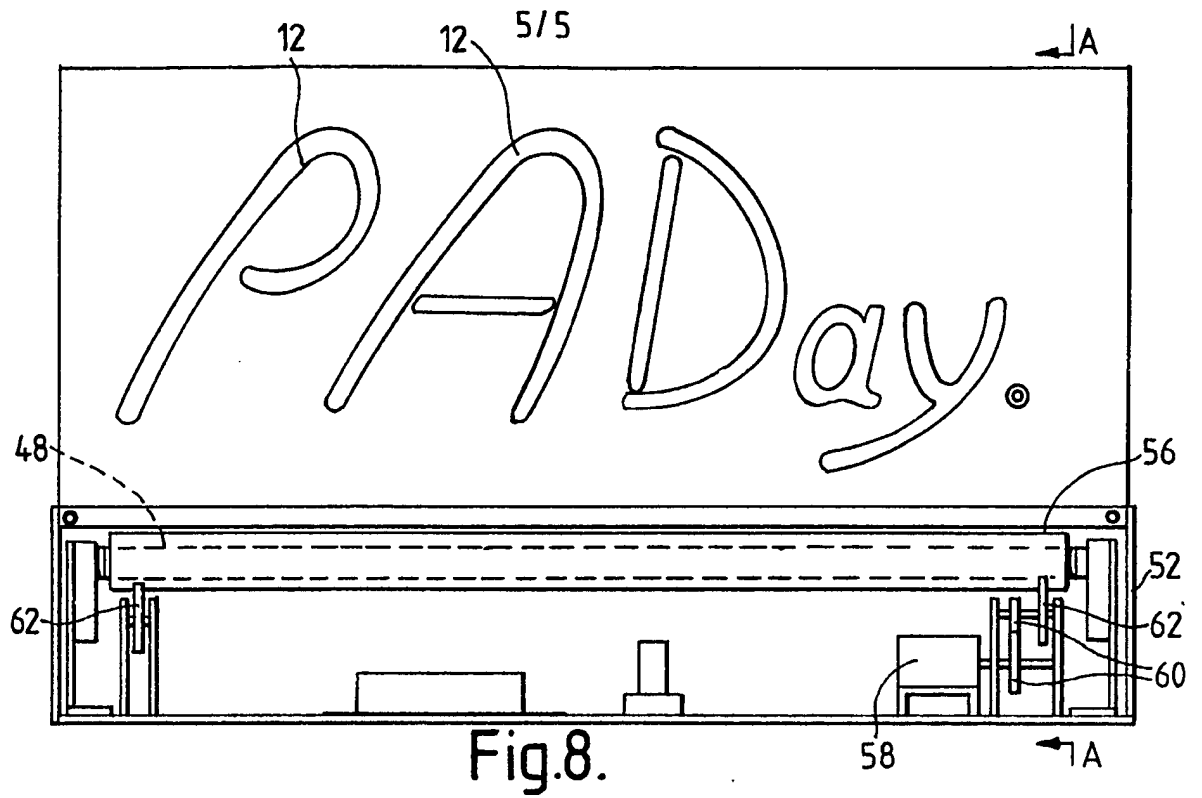


Fig. 3F.



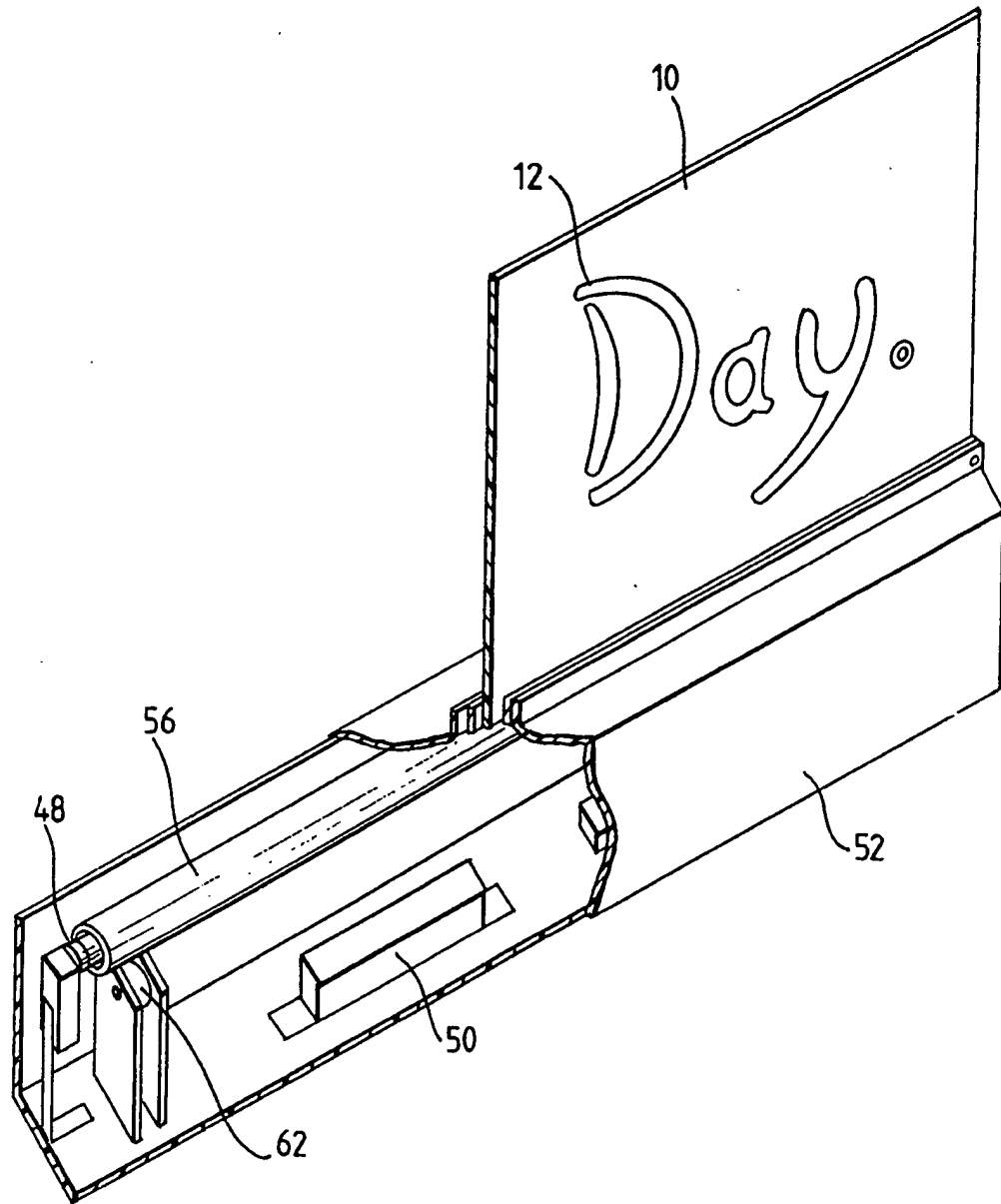


Fig.7.

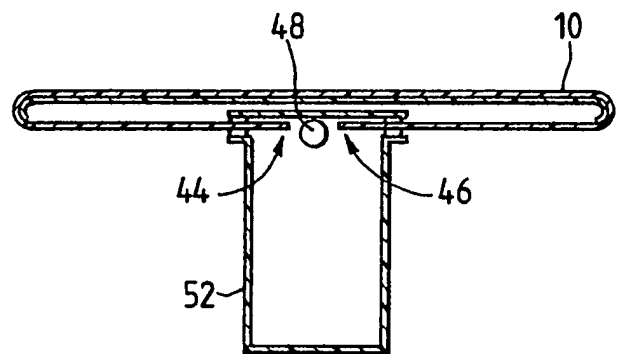
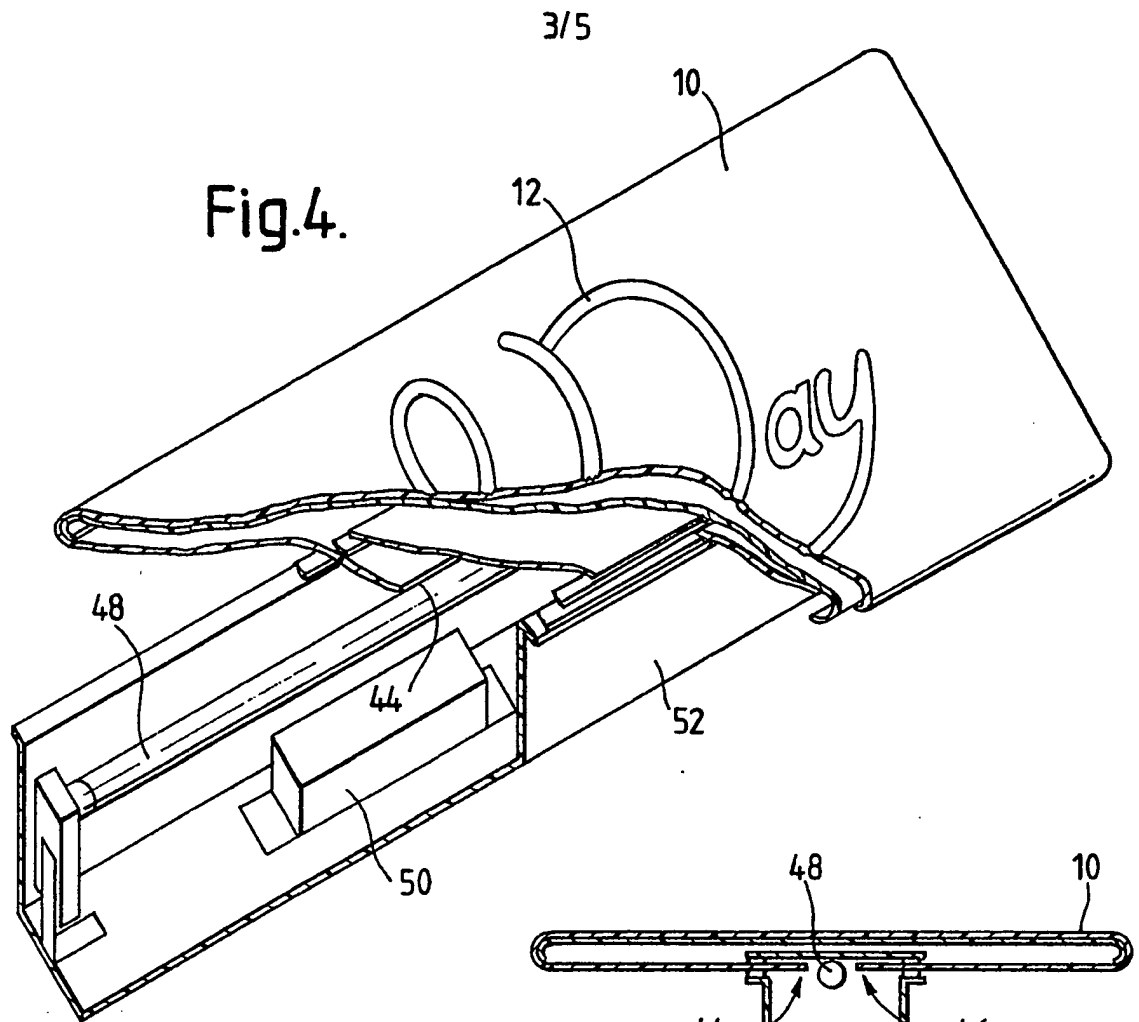


Fig.5.

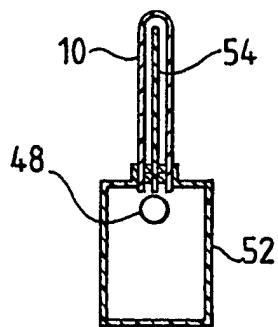


Fig.6A.

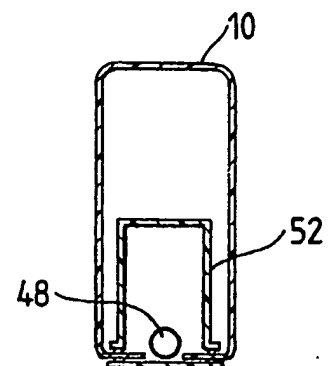


Fig.6B.

SPECIFICATION

Illuminated sign or display

- 5 This invention relates to illuminated signs and displays comprising an edge-illuminated sheet of glass of light transmitting material.

It has long been known that a plate of glass or perspex, having a pattern engraved or otherwise applied to one face, can be illuminated by a light source placed close to one of the edges of the plate so that the pattern is illuminated from within the material. By mounting the plate against a suitable background, and by grinding and polishing the edge adjacent to the light source so that it is perpendicular to the faces of the plate, an attractive sign can be created. However, such signs have the disadvantages that they are often very much less bright than for example neon signs, and characters applied to the face are not always clearly visible from all directions under some ambient light conditions. In addition the size and form of the characters is limited by the requirement that they must pick up sufficient light from inside the plate.

- 25 It is an object of this invention to provide an improved edge-illuminated sign.

According to a first aspect of this invention an edge illuminated sign comprises a sheet of light transmitting material, and a light source for illuminating the interior of the sheet through an edge thereof, wherein a pattern or information bearing characters are formed in a face of the sheet by a groove or grooves having stepped sides. In this way, the size and heaviness of characters which can be illuminated is increased since light is picked up across the width of the groove without the groove having to be cut deeply into the material, so impairing the transmission of light through the plate.

Unlike a neon display, the characters can include stub ends and dots. High voltages are not necessarily required, since low voltage lamps can be used as the illumination source. A sign constructed in accordance with the invention can be made considerably inexpensively compared with a neon sign, and has the additional advantage of being less easily breakable.

Preferably the groove sides are formed of a plurality of surface portions inclined at angle of 40° - 50° to the face of the plate, each inclined portion being separate from a neighbouring inclined portion by an intermediate surface portion parallel to the face of the plate. If, for example the grooves are formed in a rear face of the plate, light travelling through the material parallel to the faces is reflected at each inclined surface portion towards the front face and thus towards an observer.

Each groove appears as a series of lines running parallel to the direction of the groove, and distributed across the width of the groove so that, at a distance, it appears that the groove is evenly illuminated. For a material such as Perspex (Registered Trade Mark), the angle of the inclined surface should be in the region 44° to 46° for the most efficient reflection.

- 65 In accordance with a second aspect of the inven-

tion, a cutting tool for engraving the groove or grooves comprises a rotary head having a stepped cutting edge with a plurality of edge portions inclined relative to the axis of rotation of the tool which alternate with a plurality of intermediate edge portions lying substantially perpendicular to the said axis.

The invention also includes an edge illuminated sign or display with improved brightness whereby a sheet of light transmitting material has folded back edge portions so that opposite edges of the material can be illuminated from a single light source such as an elongate fluorescent tube.

According to a fourth aspect of the invention, the illumination of of an edge-illuminated sign or display can be varied by providing a fluorescent tube adjacent an edge of sheet of light transmitting material and mounting a tubular sleeve filter around the tube, the filter having differently coloured filter portions so that when the sleeve is rotated about a longitudinal axis the illumination reaching the plate varies in colour.

The invention will now be described by way of example with reference to the drawings in which;-

90 *Figure 1* is a sectional perspective view of a transparent plate forming part of an edge illuminated sign in accordance with the invention;

Figure 2 is a fragmentary perspective view of a groove cut in a transparent plate;

95 *Figures 3A to 3F* are sectional fragmentary views of cutters for engraving the grooves visible in *Figures 1* and *2* and other similar grooves;

Figure 4 is a perspective view of a folded sign, partly cut away to show its interior;

100 *Figure 5* is a sectional end view of the sign of *Figure 4*;

Figures 6A and 6B are sectional views of alternative folded signs;

105 *Figure 7* is a partly cut away perspective view of a sign with a rotatable colour filter;

Figure 8 is a front view of the sign of *Figure 7* with its cover removed;

Figure 9 is a sectional end view of the sign of *Figure 7*; and

110 *Figures 10, 11 and 12* are sectional end views of alternative edge-illuminated signs in accordance with the invention.

Referring to *Figure 1*, a transparent plastics plate 10 for an edge illuminated sign has characters 12 engraved in its rear face 14. A suitable material for the plate is clear or coloured Perspex (Registered Trade Mark), this being relatively inexpensive and easily engraved. The edges 16 and 18 are perpendicular to the faces of the plate and may be polished for maximum light transmission in the direction shown by arrows 20. Each character 12 is engraved in the plate 10 using a rotating stepped cutter so that each character line is defined by a groove 22 having stepped sides. (In *Figure 1* only one character is shown thus for simplicity.) *Figure 2* is an enlarged view of the groove 22, and it will be seen that the sides of the groove comprise a plurality of inclined surface portions 32 separated from each other by a plurality of surface portions 34 parallel to the face 14 of the plate. The angle of inclination of portions 32 is

preferably 45°, although different angles may be used for other materials having different refractive indices.

Light transmitted through the interior of the plate 10 is reflected by the grooves forming the engraved characters 12, so that from the front of the plate the characters appear illuminated. Each inclined portion 32 reflects light travelling parallel to the front and rear faces of the plate (see arrows 36) in a perpendicular direction through the front face 38 (as shown by arrows 40), so that, at a distance, the groove appears luminous across its whole width. Light transmission inside the plate is maximised by polishing all four edges of the plate to promote internal reflection. A diffused effect can be obtained by painting the grooves inside white. A backing sheet (not shown) may be placed across the rear surface of the plate to provide a contrasting background.

A cutting tool for engraving the grooves of Figures 1 and 2 and similar grooves are shown diagrammatically in Figures 3A to 3F.

To provide maximum brightness, two opposite edges of engraved plate may be illuminated, as indicated in Figure 1 simply by illuminating the two edges separately. Alternatively the plate 10 can be formed during manufacture by folding so that the two longer edges 44 and 46 face each other behind the central portion of the plate, and a single fluorescent tube 48 mounted between the edges to inject light into the plate interior from both edges as shown in Figures 4 and 5. This arrangement also has the advantage that the tube 48, its associated choke 50, and the lamp housing 52 can be positioned out of sight behind the plate 10.

Alternative folded plate configurations are shown in Figures 6A and 6B. That shown in Figure 6A has an additional inner plate 54 allowing the characters on the outer plate 10 to be superimposed on a second set of characters or patterns on an illuminated background. Alternative effects can be achieved by making the two plates of differently coloured perspex materials, or by lacquering the edges with differently coloured dyes.

In certain applications of this invention a display with varying colours may be required. This may be provided by the apparatus shown in Figures 7, 8 and 9 which comprises an edge-illuminated plate 10 having characters 12 engraved in the manner shown in Figure 2, a fluorescent tube 48 mounted adjacent an edge of the plate 10, and a rotatable tubular sleeve 56 surrounding the tube 48. Colouring is applied to the sleeve 56 so that as it is rotated by a motor 58 and a series of gears 60 and rollers 62 (Figure 9), light reaches the plate 10 through successive differently coloured filter portions.

Alternative configurations of edge-illuminated signs using a fluorescent tube as a light source are shown in Figures 10, 11 and 12.

CLAIMS

1. An edge illuminated sign comprising a sheet of light transmitting material, and a light source for illuminating the interior of the sheet through an edge

thereof, wherein the sheet bears a pattern, indicia or characters formed by a groove or grooves having a stepped side or sides cut or otherwise formed in a face of the sheet.

2. A sign according to claim 1, wherein the or each groove side has at least two inclined surface portions separated from each other by a surface portion parallel to the said face of the sheet.

3. A sign according to claim 2, wherein each inclined surface portion is inclined at angle in the range 40° to 50°.

4. An edge illuminated sign comprising a sheet of light transmitting material, and a light source for illuminating the interior of the sheet through an edge thereof, the sheet having a planar front face and a rear face which is planar over a major part of its area and is interrupted by a plurality of grooves having stepped sides, each groove forming a line constituting part of a character or pattern, the stepped sides serving to reflect light internally in the sheet towards and subsequently through the front face, whereby each character or pattern line appears, at the front of the sign, as a group of parallel illuminated narrower lines on a contrasting background.

5. A sign according to claim 4, wherein each groove has one stepped side comprising a plurality of surface portions inclined in one direction at 45° to 50° to the rear face, and another stepped side being a plurality of surface portions inclined in the opposite direction at 45° to 50° to the rear face, each inclined surface portion being separated from an adjacent surface portion by an intermediate surface portion parallel to the rear face.

6. An edge illuminated sign constructed and arranged substantially as herein described and shown in the drawings.

Printed in the UK for HMSO, D8818935, 9/84, 7102.
Published by The Patent Office, 25 Southampton Buildings, London,
WC2A 1AY, from which copies may be obtained.